

REMARKS

Claims 1-19 and 25-47 are pending. Claims 1, 25, 44 and 46 are currently amended. Support for the amendments can be found throughout the specification, for example, in the figures and at pages 11, 12, and 19-21. No new matter has been added.

Response to Examiner's comments

The Examiner has pointed out that "claims drawn to an apparatus must be distinguished from the prior art in terms of structure rather function." See the Office Action at page 2. Applicants have prepared these amendments and remarks in an effort to address this comment.

Rejections under 35 U.S.C. § 112, first paragraph

The Examiner has rejected claims 40 and 44-47 under 35 U.S.C. § 112, first paragraph, for failing to comply with the written description requirement. Applicants respectfully disagree.

With regard to claim 40, the Examiner argues that "the specification fails to define or provide any disclosure" for the phrase "adapted to provide almost simultaneous performance of a chip-based characterization and at least one reprocessing reactions and conditioning reactions." See the Office Action at pages 3-4. However, the specification describes that the device allows "an almost simultaneous, time-efficient and scarcely failure-susceptible reprocessing and/or conditioning reactions and the chip-based characterization of the reaction products to be performed." (specification at page 8). Thus, the specification provides a written description of the subject matter of claim 40. Applicants respectfully request that the rejection of claim 40 for lack of written description be reconsidered and withdrawn.

With regard to claims 44-47, the Examiner objected to the phrase "only the single chamber holds the nucleic acids for both reaction and characterization, and wherein the sample inlet and sample outlet are connected only to the single chamber" in independent claim 44 (claims 45-47 depend from claim 44). The Examiner also objected to the phrase "the single chamber is free of fluid channels to move the nucleic acids to a subsequent and characterization chamber" in claim 47. See the Office Action at page 4. A written description of these features

can be found, for example, in the drawings (e.g., FIGS. 1-3, 10a-10b and 14) and in the description at pages 11, 12, 19-21 of the specification. The specification and figures describe a device in which only a single chamber holds nucleic acids for both reaction and characterization (e.g., FIGS. 1-3 show a device with a chip in a single chamber, and FIG. 14 illustrates reaction and characterization of nucleic acids at the chip). FIGS. 1-3 also illustrate the device as being free of fluid channels to move the nucleic acids to a subsequent and characterization chamber.

For at least these reasons, Applicants respectfully request that the rejection of claims 44-47 for lack of written description be reconsidered and withdrawn.

Rejections under 35 U.S.C. § 102

Lipshutz

The Examiner has rejected claims 1-5, 8-10, 12-15, 17-19, 25-36 and 38-43 as being anticipated under 35 U.S.C. § 102 over U.S. Patent No. 5,856,174 to Lipshutz et al. ("Lipshutz").

Applicants have discovered a device including a chamber support and a chamber body. The chamber body includes an optically permeable chip having a detection area, and is placed on the chamber support to form a cavity. The cavity includes: (i) a capillary gap between the chamber support and the detection area of the chip, and (ii) a gas reservoir laterally offset from and in liquid communication with the capillary gap. See independent claim 1. Similarly, independent claim 25 recites a cavity that (i) a capillary gap between the chamber support and the chip, and (ii) a gas reservoir laterally offset from and in liquid communication with the capillary gap. In addition, the capillary gap has a height along an axis perpendicular to the detection area of the chip, and the gas reservoir has a height along the axis that is greater than height of the capillary gap. See independent claims 1 and 25.

Lipshutz does not teach or describe a device having a cavity which includes both a capillary gap between a chamber support and a detection area of a chip, and a gas reservoir laterally offset from and in liquid communication with the capillary gap. Indeed, Lipshutz does not describe any kind of gas reservoir. Nor does Lipshutz describe a device in which the capillary gap has a height along an axis perpendicular to the detection area of the chip, and the gas reservoir has a height along the axis that is greater than height of the capillary gap.

For at least these reasons, independent claims 1 and 25, and the claims that depend from them, are patentable over Lipshutz. Applicants respectfully ask that the Examiner withdraw the rejection over Lipshutz.

Woudenberg

Claims 1, 2, 4, 5, 8-10, 12, 14, 15, 17-19, 25-39, 32, 34-36, and 39-43 have been rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,126,899 to Woudenberg et al. ("Woudenberg"). See the Office Action at pages 12-16. Claims 1 and 25 are independent.

Like Lipshutz, Woudenberg does not teach or describe a device having a cavity which includes both a capillary gap between a chamber support and a detection area of a chip, and a gas reservoir laterally offset from and in liquid communication with the capillary gap.

Woudenberg describes a device including substrate defining a sample distribution network with one or more detection chambers. This network-defining substrate is shown in Woudenberg FIG. 9, feature 161. It is sealed to a flat substrate layer 180. See Woudenberg at FIG. 9 and at column 13, lines 50-53. However, sealing the flat substrate to the network-defining substrate does not form a cavity that includes both: (i) a capillary gap between a chamber support and a chip, and (ii) a gas reservoir laterally offset from and in liquid communication with the capillary gap. Even if the vacuum port or vacuum reservoir of Woudenberg (features 106 and 166, respectively) is interpreted as a gas reservoir, it is clear that Woudenberg does not teach these features as being included in a cavity with the capillary gap.

Nor does Woudenberg describe a device in which the capillary gap and gas reservoir are included within a cavity and the capillary gap has a height along an axis perpendicular to the detection area of the chip, and the gas reservoir has a height along the axis that is greater than height of the capillary gap.

For at least these reasons, independent claims 1 and 25, and the claims that depend from them, are patentable over Woudenberg. Applicants respectfully ask that the Examiner withdraw the rejection over Woudenberg.

Northrup

Claims 44, 45 and 47 have been rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,521,181 to Northrup et al. ("Northrup"). See the Office Action at page 17. Claim 44 is independent, and claims 45 and 47 depend from it.

Like Lipshutz, Northrup does not teach or describe a device having a cavity which includes both a capillary gap between a chamber support and a detection area of a chip, and a gas reservoir laterally offset from and in liquid communication with the capillary gap. Indeed, Northrup does not teach a gas reservoir at all, as the Examiner has recognized: "Northrup et al. disclose a device for duplicating and characterizing nucleic acids . . . but they do not teach the device includes a gas reservoir." See the Office Action at page 21. Northrup therefore does not teach all the limitations of claims 44, 45 and 47. For at least this reason, Applicants ask that the Examiner withdraw the rejection over Northrup.

Rejections under 35 U.S.C. § 103(a)

McBride

Claims 6 and 7 have been rejected under 35 U.S.C. § 103(a) as being obvious over Northrup or Woudenberg in view of U.S. Patent No. 6,296,752 to McBride et al. ("McBride"). See the Office Action at page 18. Claims 6 and 7 depend from claim 1. Applicants respectfully disagree.

As discussed above, each of Northrup and Woudenberg fail to teach a device including a chamber support and a chamber body, in which the chamber body includes an optically permeable chip having a detection area, and is placed on the chamber support to form a cavity which includes: (i) a capillary gap between the chamber support and the detection area of the chip, and (ii) a gas reservoir laterally offset from and in liquid communication with the capillary gap. McBride does not remedy this defect. McBride relates to an apparatus for separating a component from a composition using an array of three or more electrodes. McBride does not teach, suggest, or motivate a person having ordinary skill in the art to place a chamber body on a chamber support to form a cavity which includes: (i) a capillary gap between the chamber support and the detection area of the chip, and (ii) a gas reservoir laterally offset from and in liquid communication with the capillary gap.

The combination of Northrup or Woudenberg with McBride does not teach, suggest or motivate a person skilled in the art to make the devices of claims 6 and 7. For at least these reasons, Applicants request that the Examiner reconsider and withdraw the rejection over Northrup or Woudenberg in view of McBride.

Atwood

Claim 11 has been rejected under 35 U.S.C. § 103(a) as being obvious over Lipshutz or Woudenberg in view of U.S. Patent No. 5,475,610 to Atwood et al. ("Atwood"). See the Office Action at page 19. Claim 11 depends from claim 1. Applicants respectfully disagree.

As discussed above, each of Lipshutz and Woudenberg fail to teach a device including a chamber support and a chamber body, in which the chamber body includes an optically permeable chip having a detection area, and is placed on the chamber support to form a cavity which includes: (i) a capillary gap between the chamber support and the detection area of the chip, and (ii) a gas reservoir laterally offset from and in liquid communication with the capillary gap. Atwood does not remedy this defect. Atwood relates to a sample block for PCR. Atwood does not teach, suggest, or motivate a person having ordinary skill in the art to place a chamber body on a chamber support to form a cavity which includes: (i) a capillary gap between the chamber support and the detection area of the chip, and (ii) a gas reservoir laterally offset from and in liquid communication with the capillary gap.

The combination of Lipshutz or Woudenberg with Atwood does not teach, suggest or motivate a person skilled in the art to make the device of claim 11. For at least these reasons, Applicants request that the Examiner reconsider and withdraw the rejection over Lipshutz or Woudenberg in view of Atwood.

Fodor

Claims 16, 17, 37 and 38 have been rejected under 35 U.S.C. § 103(a) as being obvious over Lipshutz or Woudenberg in view of U.S. Patent No. 5,744,101 to Fodor et al. ("Fodor"). See the Office Action at pages 19-20. Claims 16, 17, 37 and 38 depend from claim 1. Applicants respectfully disagree.

As discussed above, each of Lipshutz and Woudenberg fail to teach a device including a chamber support and a chamber body, in which the chamber body includes an optically permeable chip having a detection area, and is placed on the chamber support to form a cavity which includes: (i) a capillary gap between the chamber support and the detection area of the chip, and (ii) a gas reservoir laterally offset from and in liquid communication with the capillary gap. Fodor does not remedy this defect. Fodor relates to photolabile nucleoside protecting groups. Fodor does not teach, suggest, or motivate a person having ordinary skill in the art to place a chamber body on a chamber support to form a cavity which includes: (i) a capillary gap between the chamber support and the detection area of the chip, and (ii) a gas reservoir laterally offset from and in liquid communication with the capillary gap.

The combination of Lipshutz or Woudenberg with Atwood does not teach, suggest or motivate a person skilled in the art to make the devices of claim 16, 17, 37 or 38. For at least these reasons, Applicants request that the Examiner reconsider and withdraw the rejection over Lipshutz or Woudenberg in view of Fodor.

Northrup in view of Woudenberg

Claim 46 has been rejected as being obvious over Northrup in view of Woudenberg. See the Office Action at page 21-22. Claim 46 depends from claim 44. The Examiner argued that Northrup teaches a device having "a chamber body including sample inlet and outlet (#35 & #36) and a capillary gap intermediate the support and body (space within chamber #31), the gap consisting of a single chamber" The Examiner concedes that Northrup does not teach a gas reservoir. The Examiner argues that Woudenberg at column 9, lines 49-64, "teach a similar device comprising a gas reservoir (i.e., a gas source) for receiving bubbles from the capillary gap whereby the degree of sample filling and detection is enhanced." See the Office Action at page 22. Applicants respectfully argue that Woudenberg does not teach the claimed features that are lacking in Northrup.

As discussed above, independent claim 44 (from which claim 46 depends) recites a chamber body placed on a chamber support to form a cavity. The cavity includes: (i) a capillary gap between the chamber support and the chip, and (ii) a gas reservoir laterally offset from and in liquid communication with the capillary gap. In addition, the capillary gap has a height along

an axis perpendicular to the chip, and the gas reservoir has a height along the axis that is greater than height of the capillary gap. These structural features contribute to the advantageous properties of the device, such as, for example, receiving gas bubbles and thermal insulation. See the specification, for example, at pages 9 and 16-17, and FIGS. 10a-10b, which illustrate how a cavity including a capillary gap and laterally offset gas reservoir can store a liquid sample in the capillary gap. As described at page 16 of the specification, capillary forces and minimization of interfacial energy can be involved in storing the liquid sample in the capillary gap. In the embodiment illustrated at FIGS. 10a-10b, when a liquid sample is stored in the capillary gap, it is laterally bordered by the gas reservoir. When devices such as those described by Northrup and Woudenberg are charged with a liquid sample, the liquid sample fills the space available in a sample chamber, such that the liquid sample is laterally bordered by the walls of the chamber, not by a gas reservoir.

Woudenberg does not teach or suggest a device having a cavity which includes both a capillary gap between a chamber support and a detection area of a chip, and a gas reservoir laterally offset from and in liquid communication with the capillary gap. The portion of Woudenberg cited by the Examiner (column 9, lines 49-64) describes

a multi-port valve (e.g., 3-way valve) that permits the network and associated detection chambers to be exposed alternately to a vacuum source, the sample inlet, and a vent or gas source. Such a valve may be used to alternately expose the network to vacuum and a selected gas source, to replace residual air with the selected gas. . . . [A] gas which may be used is carbon dioxide (CO₂), which is highly soluble in water When the sample fluid is an aqueous solution, bubbles of carbon dioxide which may form in the network during sample loading may be eliminated via dissolution in the sample fluid. The degree of sample filling in the detection chambers is therefore enhanced.

Here Woudenberg describes a gas source external to the device. The gas source is not included in a cavity with the capillary gap. Nor does Woudenberg's gas source accommodate gas bubbles from the liquid sample. Instead, it is used to fill chambers with a water-soluble gas (CO₂). When Woudenberg's network and associated detection chambers retain bubbles of CO₂, the bubbles can become dissolved in the liquid sample. It does not teach, suggest, or motivate a person skilled in the art to make a device having a cavity which includes both a capillary gap between a chamber support and a detection area of a chip, and a gas reservoir laterally offset

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from and in liquid communication with the capillary gap. Therefore, claim 44 and the claims that depend from it are patentable over the combination of Northrup and Woudenberg.

Claim 46 further recites that at least a portion of the gas reservoir is positioned between the inlet and the capillary gap. As mentioned above, the gas source in Woudenberg is external to the device, not between the inlet and the capillary gap. If the vacuum port or vacuum reservoir of Woudenberg (features 106 and 166, respectively) is interpreted as a gas reservoir, these features are not shown as being included in a cavity with the capillary gap.

For at least these reasons, claim 46 is patentable over Northrup in view of Woudenberg. Applicants respectfully request that the Examiner withdraw the rejection.

CONCLUSION

Applicants ask that all claims be allowed. A petition for a 5-month extension of time, and a check for the required fee, are filed with this reply. Please apply any charges or credits to deposit account 19-4293.

Respectfully submitted,

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Harold H. Fox
Reg. No. 41,498

Customer No. 27890
Steptoe & Johnson LLP
1330 Connecticut Avenue, NW
Washington, DC 20036-1795
Phone: 202-429-3000
Fax: 202-429-3902